WHAT IS CLAIMED IS:

1. A method of canceling an interfering signal contained in a received signal which includes a signal of interest, the interfering signal being a delayed and frequency offset version of a transmitted signal from the location of the received signal, the method comprising converting the received signal and a sample of the transmitted signal to digital form; tracking variations in delay, frequency offset and frequency dependent gain and phase variation between the interfering signal and the sample of the transmitted signal to produce a compensating signal; combining the compensating signal and the received signal to cancel the interfering signal and produce the signal of interest; generating an error signal from the signal of interest representing any uncanceled components of the interfering signal in the signal of interest; and controlling said tracking with the error signal to minimize offsets between the compensating signal and the interfering signal.

2. The method of claim 1 further comprising converting the signal of interest to analog form for demodulating the signal of interest.

3. The method of claim 2, wherein said converting comprises converting the signal of interest to an IF signal.

4. The method of claim 1, wherein said tracking comprises applying a variable delay and frequency offset to the sample of the transmitted signal to compensate for initial delay and frequency offsets and to produce an intermediate result; and adaptively filtering

the intermediate result to track fine delay, amplitude and phase offsets to produce said compensating signal.

5. The method of claim 4, wherein said adaptively filtering comprises filtering the intermediate result with a variable finite impulse response filter.

6. The method of claim 5, wherein said controlling comprises controlling said filter coefficients with said error signal to minimize said fine delay, amplitude and phase offsets.

7. The method of claim 6, wherein said filter has a plurality of tapped delay stages, each stage having a tap weight, and said controlling comprises controlling the center of mass by controlling the weight of each tap.

8. The method of claim 7 further comprising deriving said error signal by determining the power in samples of the signal of interest, using said error signal and an existing adaptive filter weight update algorithm to control the filter tap weights so as to minimize the power in the signal of interest.

9. The method of claim 1, wherein said tracking comprises tracking the frequency offset between the received signal and the adaptively filtered intermediate result, and applying a frequency compensation to said sample of the transmitted signal after compensation for initial delay.

10. The method of claim 9, wherein said tracking and applying comprises tracking the frequency offset and applying said frequency compensation using a phase locked loop.

11. The method of claim 4, wherein said applying a variable delay to the sample of the transmitted signal comprises applying a delay offset with a delay memory, and controlling said delay memory with said error signal so as to minimize the power in the output signal of interest.

12. The method of claim 1, wherein said converting comprises converting separately the received signal and the sample of the transmitted signal from an IF to digital signals, and down converting the separate digital signals to baseband.

13. The method of claim 1, wherein said method of canceling is performed on said digital signals at baseband.

14. A method of canceling at a receiving site an interfering signal in a received signal that contains the interfering signal and a signal of interest, the interfering signal corresponding to a delayed and frequency offset version of a transmitted signal transmitted from the site, the method comprising converting the received signal and a replica of the transmitted signal from intermediate frequency form to baseband digital form; estimating first offsets corresponding to coarse delay and frequency differences between the transmitted

signal and the interfering signal; applying first delay and frequency compensations corresponding to the estimated offsets to the replica of the transmitted signal to produce a first compensated replica of the transmitted signal; tracking variations in delay, frequency, amplitude and phase offset between the first compensated replica and the interfering signal to produce a second compensated signal; combining the second compensated signal and the received signal to cancel at least in part the interfering signal and produce the signal of interest; generating an error signal from the signal of interest; and controlling said tracking with said error signal to minimize offsets between the second compensated signal and the interfering signal.

15. The method of claim 14 further comprising converting the signal of interest to an IF signal, for demodulating said IF signal with a modem.

16. The method of claim 14, wherein said estimating comprises cross correlating the replica of the transmitted signal and the received signal to produce a result, and determining the first delay and frequency compensations from said results.

17. The method of claim 16, wherein said cross correlating comprises performing cross correlations over a range of assumed delay and frequency offsets, collecting the results from said cross correlations, and said determining comprises determining the first delay and compensations from said collected results.

18. The method of claim 17, wherein said determining comprises comparing said collected results to a predetermined threshold value, selecting a peak, and determining said compensations from delay and frequency offsets associated with said peak.

19. The method of claim 16, wherein said cross correlating comprises Fourier transforming the replica of the transmitted signal and the received signal to produce respective sequences; shifting a first one of the sequences relative to a second one of the sequences; forming a complex conjugate multiplication result of the first and shifted second sequences; inverse Fourier transforming the result of said multiplication; and comparing the Fourier transformed result to a predetermined threshold.

20. The method of claim 16 further comprising determining a fine frequency compensation for said replica of the transmitted signal by accumulating a plurality of cross correlation results to produce an average result; comparing the average result to the predetermined threshold to confirm said peak; Fourier transforming the accumulated results which confirmed the peak to produce an array of magnitude values; and identifying the fine frequency compensation from an offset associated with a maximum magnitude array value.

21. The method of claim 14, wherein said tracking comprises applying to the replica of the transmitted signal varying delay and frequency compensations in response to the error signal to produce said first compensated replica signal; and adaptively filtering the

first compensated replica to track variations in delay, amplitude and phase and applying said varying compensations to the replica to produce the second compensated signal.

22. The method of claim 21, wherein said applying a variable delay compensation comprises controlling a delay memory in response to the error signal to delay the replica of the transmitted signal, and applying a variable frequency compensation comprises adjusting the frequency of the delayed replica with a phase lock loop controlled by the second compensated signal and the received signal.

23. The method of claim 22 further comprising measuring the power in the signal of interest to produce the error signal, and controlling said adaptive filtering and said variable delay with said error signal to minimize the signal of interest power.

24. An interference canceler for canceling an interfering signal corresponding to a delayed and frequency shifted version of a transmitted signal from a received signal containing the interfering signal and a signal of interest, comprising a variable delay for applying a first delay compensation to a replica of the transmitted signal; a variable frequency element for tracking changes in frequency and for applying a first frequency compensation to the replica of the transmitted signal; an adaptive filter for tracking delay, amplitude and phase variations in said replica following said first compensations for delay and frequency to produce a cancellation signal; and a combiner for combining the received signal and the cancellation signal to cancel the interfering signal and produce the signal of interest.

25. The canceller of claim 24, wherein the adaptive filter comprises a tapped adaptive FIR filter having a plurality of fixed delay stages, each stage having a tapped output and a corresponding weight element, and a summer for providing a combined output of said tapped stages.

26. The canceller of claim 25 further comprising a minimum output power processor for determining the output power in the signal of interest and for generating an error signal for controlling said adaptive filter and variable delay to minimize said signal of interest power.

27. The canceller of claim 26 further comprising an analog to digital converter for converting said the received signal and the replica of the transmitted signal to digital signals; a downconverter for downconverting the digital signals to separate digital baseband signals corresponding to the replica of the transmitted signal and the received signal; said variable delay, said variable frequency element, said adaptive filter and said combiner operating on said digital baseband signals.

28. The canceller of claim 27 further comprising a digital baseband processor, said digital baseband processor comprising a microprocessor and associated control programs for implementing said variable delay, said variable frequency element, said adaptive filter and said combiner.

29. The canceller of claim 28, wherein said minimum output power processor and said least mean square element comprise control programs running in said microprocessor.

30. The canceller of claim 26, wherein said variable delay comprises a dual port memory, a delay processor responsive to the error signal, and an address generator for controlling the memory to minimize the delay offset in the replica signal, and wherein the variable frequency element comprises a digital phase locked loop controlled by an output from the adaptive filter.

31. The canceller of claim 27 further comprising a digital baseband processor, said digital baseband processor comprising dedicated electronics and associated control programs for implementing said variable delay, said variable frequency element, said adaptive filter and said combiner.